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INTRODUCTION TO MICROMETEOROLOGICAL AND TRACER DATA ARCHIVE PROCEDURES

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16. ABSTRACT

This report provides a user-oriented introduction to the archive structure and contents. The archive includes both documentation and data. A data set documentation report is prepared for each archived data set. The entries in the documentation are as follows: data set fact summary, a narrative description of experiment and data, special information, references, a description of archive data files, contacts (names, addresses, and phone numbers) and standard experiment summary tables. The data are entered into the archive in a form as close to original form as possible to maintain a clear link with original records. The archived data are contained within a well-defined structure called data map. The data map allows data to be entered in original formats, while providing the user with a machine-readable pathway for accessing the diverse data formats. Standard words are used for mapping variables and their units within the various data sets. This feature allows global scanning of data sets for specific variables. The data structure is designed so that selected portions may be loaded into the user's data base system or it may be accessed using a custom computer program. An example of a computer code for accessing the data is given.

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ABSTRACT

An archive for micrometeorological and tracer dispersion data has been developed by Battelle, Pacific Northwest Laboratories for the U.S. Environmental Protection Agency. The archive is designed to make the results of extensive field tests readily accessible for model testing, development, and verification efforts.

This report provides a user-oriented introduction to the archive structure and contents. The aim of this effort is to archive invaluable data sets in a timely fashion before the necessary supporting information about the data becomes lost forever.

The archive includes both documentation and data. A data set documentation report is prepared for each archived data set. The entries in the documentation are as follows: data set fact summary, a narrative description of experiment and data, special information, references, a description of archive data files, contacts (names, addresses, and phone numbers) and standard experiment summary table.

The archive is contained in five or more files on magnetic tape, and these consist of a header file, three documentation files, and one or more data files.

The data are entered into the archive in a form as close to original form as possible to maintain a clear link with original records. The archived data are contained within a well-defined structure called data map. The data map allows data to be entered in original formats, while providing the user with a machine-readable pathway for accessing the diverse data formats.

Standard words are used for mapping variables and their units within the various data sets. This feature allows global scanning of data sets for specific variables.

The data structure is designed so that selected portions may be loaded into the user's data base system or it may be accessed using a custom computer program. An example of a computer code for accessing the data is given.

This effort was conducted by Battelle, Pacific Northwest Laboratories for the Atmospheric Science Research Laboratory, U.S. Environmental Protection Agency.

CONTENTS

Abstract iii
Figures vi
Tables vi
Acknowledgment vii

1. Introduction. 1
2. Archival Structure 3
Overview 3
Master archive tape contents 4
Archive data tape contents 5
Header . . . . . .(file #1). 5
Documentation report . . . .(file #2). 5
Data map variables list . . .(file #3). 9
Standard experiment summary .(file #4). 10
Archived data files . . . . .(file #5+) 10
3. Data Map. 11
Data Map Components 11
Data record. 12
Data record prefix 12
Data map set contents section. 15
Data map subset sections 15
Data set end 15
Data variable definitions. 16
Data map example 16
Key word definitions. 18
4. Data Access 22
How to use the archive. 22
General approach 22
Sample FORTRAN program 23
Checksum values. 23
Management and maintenance 24

References 25
Appendices 26
A. Quality Assurance Procedures. 26
B. Archive Status. 29
C. Data Archive Examples 33
Partial Listing of Archive Data Set 001 33
Partial Listing of Archive Data Set 002 35
D. ACCESS - A FORTRAN Code Illustrating Data Access 39

Glossary 50

FIGURES

Number		Page
1	Detailed contents of the prefix	14
2	Use of key words in data map structure	17
B-1	Data set fact summary form for archive set number 001	31
B-2	Data set fact summary form for archive set number 002	32

TABLES

Number		Page
1	Types of archival magnetic tape files	6
2	Contents of data set fact summary form	8
3	Data record prefix	13
B-1	List of M&T data archive sets	30

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SECTION 1

INTRODUCTION

Modeling activities under way at the U.S. Environmental Protection Agency (EPA) require that micrometeorological and tracer dispersion study results be readily accessible for model testing, development, and verification activities. Although numerous studies have been conducted generating data sets of interest, the divergence of data locations, formats, and documentation for these sets tends to make their use a formidable task. This effort is aimed at identifying and archiving data sets; this is to be accomplished while gaps in important supplemental information can still be obtained from original researchers. This report provides an introduction to the micrometeorological and tracer dispersion data archive (M&T data archive).

This effort was conducted by Battelle, Pacific Northwest Laboratories for the U.S. Environmental Protection Agency, Atmospheric Science Research Laboratory. The project scope was to survey data sets, recommend data for archiving, develop procedures and a structure for archiving data, and then demonstrate the procedures by archiving several data sets.

The goal of this archiving effort was to provide for documentation, access, and preservation of data from micrometeorological and tracer studies. A direct visual trail is maintained between the original and archive entries. Reformatting and restructuring are advoided; this provides for a relatively secure archive that will not be necessarily optium for use in specific analysis.

The archive is a combination of data and required support information. It is designed to provide all information that is needed to access data. This volume provides the user with sufficient generic information for using the archive.

A survey was made to identify data sets for archiving (Woodruff and Glantz, 1985). A list of available data sets is provided in a form such that modelers can readily scan and use to identify studies relevant to their needs. Detailed information is provided in tabular form on each study.

The archive has two types of tapes--a master archive tape and archive data tapes. The former is a single summary tape containing documentation files for all data sets in the archive. The latter are the separate data

tapes for each of the archived data sets. The archive structure discussed below refers to the manner in which information for each set is entered on the archive data tapes.

The archive structure and access procedures are described in this volume. The archive was designed to incorporate documentation and supplementa' information as part of the archival structure. Minimal changes were made in the form of original data while moving them to the archival data base. This allows a direct visual trail to be maintained between original and archive entries. A data map was incorporated into the archive to allow a common approach for accessing data and documentation.

The quality assurance procedures and guide.nes that were developed for the process of creating data archives are given in Appendix A.

The current archive status and contents at the time of preparation of the current version of this report are given in Appendix B. Two data sets were selected as part of the initial development of the data archive structure: Minnesota 1973 and Hanford 1964 Series. Partial data listings of these archive sets are given in Appendix C.

SECTION 2

ARCHIVAL STRUCTURE

The archive is structured to allow efficient user access to archived data while maintaining the original format of reported data. This section provides an introduction to the generic archive structure. The following sections provide detailed information on archive components and how they are to be used.

OVERVIEW

The data are contained in the archive as individual sets of data. Each set consists of a single group of similar experiments. Normally a set refers to a well-defined series of field studies conducted over a limited time period. This grouping into sets provides the user with coherent, logical divisions of data.

Each set selected for archiving is given a three-character code, used to identity all records for that set. The same archive structure is used in each set.

This structure consists of a series of documentation and data files. The same types of documentation entries occur in the same order in each archived data set. The archived data reside within a specially designed generic data access structure.

To understand the archive structure, one must realize that our objective is to provide a computer-readable medium for preserving both documentation and data from field studies. We avoided tailoring the archive to a single data base structure or computer-operating system.

The ease of data access was emphasized as much as possible while still meeting objectives of the archive. The data archive structure described below may be accessed by computer programs. This may be accomplished using a data base program, or alternatively a custom computer program.

A data archive consists of a series of files stored on magnetic tape. The files with archived data are preceded by a standard set of documentation entries consisting of items such as a narrative summary of the experiment, a table of standard parameters, references, and archival notes.

Experimental results are archived in a form as close to the original reported form as feasible. This allows direct confirmation of data integrity both during entry to the archive and by future users of the archive.

Using the original data formats also significantly reduces the possibility of introducing errors into the data set. The problems related to interpreting, reformatting, sorting, converting units, and otherwise transforming original data are avoided.

On the other hand, if original data listings are used, the archives then contain data in a wide variety of forms. Some means needs to be provided for accessing these wide variety of data forms.

The data map provides the information needed to access various data forms. It consists of highly structured data access information that provides definitions and location vectors for each entry in the archived experimental results.

The data map includes both general information about the archived study and specific information for reading archived data. The general information includes items such as archive number, title, footnotes, and sources of each data entry.

The name 'data map' comes from the fact that it provides directions to locations of data parameters within the archive. To accomplish this, the data map provides the formats for reading data along with definitions, units, and locations for each archival data variable.

The data map structure is designed to be both machine and human readable. Although we believe the main application will be automated computerized data scans, the data map may also be visually scanned for information.

A key part of the archive design involves the use of standard names for data parameters in the data maps. The global usage of these standard names will facilitate the process of scanning multiple data sets for desired variables. For example, the user may scan for all the standard words reserved for wind speed to check to see which data sets contain wind speed information.

In summary, the data archive consists of a series of files. The first files are documentation files. These are followed by data files with archived data, which are contained within a data map structure designed to facilitate access.

MASTER ARCHIVE TAPE CONTENTS

The master archive tape contains documentation files for the M&T data archive. The first file is a machine printable copy of the latest version of this archive introduction report. Then the documentation files for each of the data sets in the archive are given as separate additional files.

These are a compilation of the second files from archive data tapes for all archived data sets; the detailed contents of this documentation file is given below in the discussion of the archive data tape contents.

As data sets are added to the M&T data archive, the documentation files are merely to be added to the master tape. If revisions, corrections, or additions are made to any archived data set or this report, the master tape is also to be rewritten. For archive data sets, the documentation file will be revised reflecting a new archive set version number.

Thus, the master tape is designed to provide documentation to the current status of the archive in a manner that is easily revised as new data sets are added to the archive.

ARCHIVE DATA TAPE CONTENTS

There are two types of files on the data archive tape: documentation and data files. These are summarized in Table 1. First there are four documentation files. The first file is a header file. Next are a documentation file for printing/visual scanning and two files suitable for either machine or visual scanning. The fifth and additional files are data files.

The normal total number of files on the tape is five. More than five files occurs only in cases of very large data sets where the archived data are contained in more than one file.

Header (File #1)

As the name suggests, this is a small tape documentation file containing header information identifying tape contents and format. This is not a machine-dependent tape header, rather the information is in a general purpose text format for use on a variety of computer systems.

Documentation Report (File #2)

As noted above, documentation entries are designed to include information to help the user access archived data. Notes are given for each entry to identify this type of information and its utility within the archive.

Archive file #2 contains a printable copy of the 'Individual Data Set Documentation Report'. This report has two sections:

Section 1. Introduction--contains general information on the archive. This section will be essentially the same for each archived data set. The purpose, contents, and organization of the individual documentation report are described. An overview of the M&T data archive is given along with reference to this introduction report. This section is brief; the user should look to the introduction report as the primary source of information.

TABLE 1. TYPES OF ARCHIVAL MAGNETIC TAPE FILES

Type of file	Number of files	Order on tape	Contents
Documentation	4	1	Header File
			Archive Number
			Archive Name
			Tape Contents List
		2	Printable copy of 'Individual Data Set Documentation Report'
			Section 1.
			Introduction
			Section 2.
			Data Set Fact Summary
			Narrative Description of Experiment and Data
			Special Information
			Documentation
			Files Description
			Contacts
			Standard Experiment Summary Table
		3	Data Map Variables List
		4	Standard Experiment Summary Table
Data File(s)	1+	5	Archived Data

Section 2. Data Set Documentation Entries--contains documentation listings for the study being archived. The order and format of these listings are the same for each archived study to maximize their utility. The contents of these seven listings are as follows:

Listing #1. Data Set Fact Summary (DSFS) Form. Contents of this form are shown in detail in Table 2. The headings in these entries are

- Archival Data Set Title
- Experiment Type
- Name
- Purpose
- Location
- Time
- Number of Tests
- Nature of Experiment
- Meteorological Conditions
- Meteorological Measurements
- Measurement Methods

These entries contain general characteristics of tests for fast visual or computer scans. The form is designed so that basic information from each data set fits on a single printed page for inclusion in hard copy documentation.

Listing #2. Standardized Experiment Summary (SES) Table. The information in this table is derived from the survey data base (Woodruff et al., 1985).

This summary has a data structure suitable for either visual or machine access. The data values are entered in delimited format separated by commas. Both numerical and logical variables are contained in this summary.

These tables provide a means of easily scanning data sets visually or digitally for specific conditions during the tests. The contents of these tables are derived from archived data. The table for each data set is included in the data archive tape for that data set (see file #4). Unlike archive data, these values and units are standardized to provide consistent data for scanning.

Although generation of this table adds considerably to the effort required in archiving, this table allow the user of the archive to scan and compare conditions in diverse data sets. This table is also designed so that summary information from each data set should normally fit on a single printed page.

These summaries are for data set selection purposes only. Values are converted to a standardized form to allow comparison between data sets. For modeling and other applications, the values from the archive data should be used.

TABLE 2. CONTENTS OF DATA SET FACT SUMMARY FORM

Entry Number	Item	Contents
1	Archival Data Set Title	Archive name with archive set number (i.e., M&T DATA ARCHIVE 001)
2	Experiment Type	Descriptive list defining the type of experiment. For the M&T DATA ARCHIVE the type is defined as the applicable combination of the following, Atmospheric Dispersion Micrometeorological Planetary Boundary Layer Surface Boundary Layer Tracer
3	Name	A short name is assigned to each study. If a popular name is obvious from the documentation, it is used. Otherwise the study is named based on the common practice of using the location and the year the study were conducted (i.e., MINNESOTA 1973).
4	Purpose	As stated in the study.
5	Location	Where experiments were conducted.
6	Time	Dates when experiments were conducted.
7	Number of Tests	Self-explanatory.
8	Nature of Experiment	Short summary of the major characteristics of characteristics of experiments.
9	Meteorological Conditions	Time of day, stability during experiments.
10	Meteorological Measurements	Description of meteorological parameters that were measured.
11	Measurement Methods	Summary of how measurements were made during experiments.

Listing #3. Narrative Description of Experiment and Data--Contains a summary of the archived study.

This information is abstracted from documentation to provide the user with an overview of details of the archived experiment and data characteristics.

Listing #4. Application Notes--Contains the following entries:

- Past uses
- Limitations
- Difficulties

These entries contain narrative information derived from documentation to help the user better understand the nature of data in each data set.

Listing #5. Documentation--Contains status and condition of the original data and listings of applicable reports and publications.

This entry provides information necessary for the user to obtain additional information on the original data.

Listing #6. Data Description--This entry contains:

- Overview
- List of terms defined for use in data map
- Notes on data structure within the archive
- Number of files
- List of tables
- Source of information for each table
- Data base creation and revision log

This file provides the user with a description of the data in the files to follow.

Listing #7. Contacts--Contains a list of associated researchers and research organizations and notes of contacts made during the process of archiving data set.

This file identifies contacts that the user can use to obtain additional information.

Data Map Variables List (File #3)

Archive file #3 contains the 'Data Map Variable List'. This is a complete listing of all data variables that are contained in each archive. This alphabetically sorted list of terms used in the data map for archived data contains a data map variable name, definition of the variable, units of the variable.

Standard Experiment Summary (File #4)

Archive file #4 contains a separate machine readable copy of the 'Standard Experiment Summary' (SES) Table described above in Archive file #2, Listing #2.

Archived Data Files (Files #5 and higher)

The archive data file(s) follow the documentation files. The contents of these files include both the archived data and information describing these data. The descriptive information is referred to as a data map. A general discussion of the data map is given below; the data map contents are detailed in section 3.

The data map is merely a consistent structure for placement of data. The data map is like a multipurpose building that always has its doors, stairs, and signs in the same locations. Once one becomes familiar with the building plan, the task of finding one's way around any building with the same plan is simplified by the standardized environment. In the same way, the task of finding relevant data is simplified by the data map. Once one is familiar with the data map structure given in section 3, one is prepared for accessing information from any of the data sets in the archive.

The data map structure serves two purposes: 1) it provides a means for detailed scanning of the contents of the data set without having to access the archival data, and 2) it allows the user to access the data without having to be concerned over details relative to the wide variety of archival data formats.

The entries within this structure are standardized as much as possible. Check sum values are included to allow user verification of the integrity of the archival information. All information is coded in ASCII in a selected standard block size.

These files contain the archived data in a format as similar to the original as possible. This facilitates comparisons with the original data for data points of special interest or concern.

When possible, all information and data are entered into the archive files with a logical record length (line length) not exceeding 80 characters per line to allow viewing on 80-column displays, or printing on 80-column printers. In no case are the line lengths to exceed 128 characters to maintain viewing and printing compatibility with most modern terminals and printers.

SECTION 3

DATA MAP

The archived data files have two types of records, those which describe the data (the data map) and those which are the data. This section provides a description of the components of the data map, a list of definitions for key words, and an alphabetical list of data archive terms.

DATA MAP COMPONENTS

The logical record length in the archive is a single line of information. Note that actual record lengths on the magnetic tape are different than the logical record length. The archive structure is designed in terms of the logical record length, which will be referred to both as a record and line, depending on the context.

The data map has three major components: data record prefixes, set contents section, and subset sections. The data record prefixes are the first 18 characters of every line including data map and archived data entries. These contain the archive number, record number, run number, subset number, and type of information on the line.

The set contents section occurs first and contains general information on the archived data set contained including the archive number and title, a short narrative description, and any global definitions. The contents of archived data are defined in specific table data maps.

The subset sections contain the archived data. These start with a series of records that define the contents and locations of archived data parameters. These are followed by the listings of archived data.

A subset may contain the data of one or many tables. The definition of a subset within the archive is normally in terms of a consistent tabular format for the archived data. As a result, the size of subsets vary from relatively short entries (small tables) to extensive entries with many tables of the same format.

The data within each subset may be any form or order. Following the concept of retaining the original form and order of data as closely as possible requires some standardized means of defining the contents of the subsets. The data map provides the means of describing the contents and locations of archived data.

An understanding of the structure of the data map components are needed to access the archived data. A description of the contents of each archive component follows.

Data Record

Each archive set consists of a series of records containing either data map information or archived data. As previously noted, a logical record length is a single line entry in the archive. Each line within the archive has two distinct parts--data record prefix followed by archive information.

Data Record Prefix

The data record prefix is an 18-character header that appears on every line of the archive. Through the data map structure, this prefix defines the type of archive information in the rest of the record: either data map information or archived data.

This prefix provides the means of linking the data descriptors and the archived data. Through the use of key words, this prefix identifies the set within the archive, the subset within the set, the run (as applicable) within the subset, a line type descriptor, and a sequential record (line) number. This prefix has contents as listed in Table 3 and the form illustrated in Figure 1. The following discussion describes the use of prefix values as key words which is then expanded in the subsequent discussions of the set and subset contents and structure.

The prefix provides a definition of characteristics of each record. The inclusion of the SET in every record ensures that data from different sets can be easily identified. The RECORD NUMBER provides a consistent means of checking the integrity of the data archive for extra or missing records.

The RUN provides an means of marking all data relating to a specific experiment or test. SUBSET entries clearly delineate the general set information (SUBSET=000) and the various logically grouped subsets of archived data (0<SUBSET<1000).

The LINE prefix is a key part of the data map structure. The progression of LINE prefix values within the archived data by firm rules delineates the start, type, and end of information both within both the set and subset sections.

The data map structure uses the LINE prefix in combination with the adjacent record information to form a two-word key word that marks the divisions between archive sections. For example, the start and end of data in each set are marked with SUB START, and SET END. In these first four characters are the LINE descriptor and the final prefix space. The remaining characters are the archival information entry that follows the designated prefix.

TABLE 3. DATA RECORD PREFIX

Record Column Numbers	Name of Entry	Meaning	Examples showing position in generic 18-character prefix, ppprrrrrreeeffiiix and typical definitions.
1-3	SET	Number assigned to identify each data sets.	002rrrrrreeeffiiix indicates a data record for archive #2 (Hanford 64)
4-9	RECORD NUMBER	Record number in each set starting with record 000001	ppp000123eeeffiiix = 123th record (line) of archived data within in a set
10-12	RUN	Number referring to logical data groups as mapped in the set contents section (000 = general, >000 = data group)	ppprrrrrr004ffiiix = data group number #4 refers the fourth run or experiment in the set
13-14	SUBSET	Number assigned to subset of archived data, consecutive numbering, where 00 = set data >00 = subset data	ppprrrrrreee03iiix = record contains subset #3 data
15-17	LINE	Line Type as defined in data map where SET = Set data SUB = Subset data LIN = Formats or Fields data Lnn = Archive Data Line #nn	ppprrrrrreeeffL02x = record contains data in the format and fields assigned to line type L02 in the archive
18	SPACE	A single space always separates the prefix and archive information	

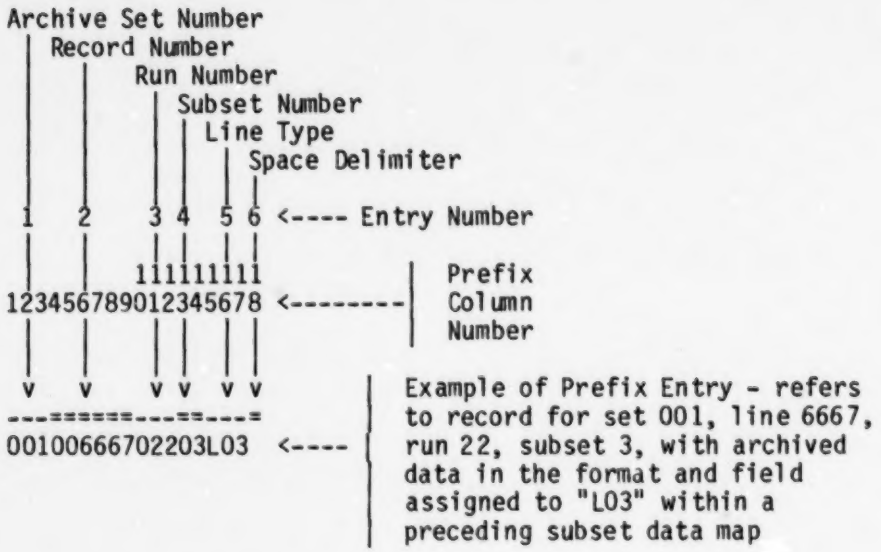
Archive Set Number
Record Number
Run Number
Subset Number
Line Type
Space Delimiter
1 2 3 4 5 6 <---- Entry Number
11111111
123456789012345678 <--------
Prefix
Column
Number
v v v v v v
001006667022O3L03 <----
Example of Prefix Entry - refers to record for set 001, line 6667, run 22, subset 3, with archived data in the format and field assigned to "L03" within a preceding subset data map

Figure 1. Detailed contents of the prefix

The LINE prefix is a key index to the definition of the contents and location of archived data. A LINE value of "LIN" is used to designate lines with definitions of formats and variables. Then these definitions are indexed to LINE values (such as "L01," "L02," etc.) that occur in the records with archived data.

Finally, the space as the final character in the prefix is provided to separate the prefix and archive information in each record. The use of these prefix values are described in detail in the following sections.

Data Map Set Contents Section

The data map set is a collection of experimental releases that are related. An example of a set is the Hanford 1964 data. Each set is assigned a unique number that occurs as the first three characters of every record in the archive of that set (see SET in Table 3). The definition of what comprises a set is determined by the persons who archived the data. These sets should be viewed by the archive user as separate coherent bodies of information.

The prefix for all lines in the data set contents section has a prefix line type (see LINE in Table 3) of 'SET'. The first line in an archive is always SET START. This section contains general information about the current archived data set.

After the end of the data set contents section, the only additional entry with a line type of SET occurs as the last record in the archive and marks the end of the archived data for this set (see SET END in data map key words given below).

Data Map Subset Sections

The data subset sections contain the archived data. They follow the set information. First, starting with a SUB START line, a series of lines with a line type of SUB contain information on the start, title, source, format type, and name of the subgroup. Second, lines of type LIN define the formats and fields for the data to be listed in the subset.

Then a line of type SUB DATA precedes lines with the archive data entries, each of which have types of the form 'Lnn'. The nn has a value between 00 and 99 and refers to format and field definitions given in the beginning of the current data subset section.

Data Set End

A data subset ends when a line of type SUB or SET occurs. This will be either a SUB START for starting a new subset of data, or a SET END to mark the end of all data for the current set.

Data Variable Definitions

A key part of the archive design involves the use of standard seven-character names for both data variables and their units description entries in the data maps. For example, when the standard name 'WINDDIR' is used in the data map in any of the archived data sets, it will always refer to a data entry giving wind direction information.

For each archive set, the specific definition and units for a standard word are part of the data map (see key word entry LIN FIELD). The definition of data entry locations are accomplished as a combination of the LIN FIELD and LIN FORMAT key words.

This feature will become useful as the number of data sets in the archive expands. Global searches for special variables will be possible using the variable standard words. This search may be made quantitative by using the description standard words for units. The final project report will contain lists of standard words that have been used for both variables and their units.

Data Map Example

The basic elements of the archive structure are illustrated in Figure 2. A delimiter of '\' is used in the archive to separate entries. In this example only, the contents of the information/data entries are indicated inside the square brackets. Single line entries are shown to illustrate of the sequence of the archive structure on a single page--actual archives have multiple record entries for many of the key words.

Figure 2 shows the manner in which the key word elements are used to define the data map. The usage of various key words is explained below (see KEY WORD DEFINITIONS). Notice that SUBFORMAT and LIN FIELD record entries provide the format and variable definitions. The SUB FORMAT defines whether the data are listed in free or fixed format. The data entries are mapped in terms of a data line type Lnn. A LIN FIELD entry occurs for each data variable in the line Lnn and contains each variable's name, units, format (if fixed format), and definition. Because each variable is indexed to a line type (Lnn) and a position within a list of values (Fxx), this provides a complete definition of the archived data, its location, and its format. Note that this allows definition of up to 99 line types and 99 positions for archived data values in each archive subset.

The LIN FORMAT entry for the data line Lnn provides the FORTRAN format for the entire data line. This format is not as easily used in accessing the data as the format information on the LIN FIELD entries. The LIN FORMAT entries may be useful in certain situations, and are provided as an alternative means of mapping data.

Examples of two archived data sets are given in Appendix C. The information in Figure 2 can be better understood by referring to these archives.

```
Archive Set Number - - - - - - - - -|
  | Record Number - - - - - - - - - -|  Archive
  |    |   Run Number- - - - - - - - -|  Prefix
  |    |    | Subset Number- - - - -|
  |    |    | | Line Type- - - - - -|- - - - - - -|  Archive
  |    |    | |   | Space Delimiter -+- - - - - - -|  Key Word
  |    |    | |   |  | Archive Information/Data - -|
  |    |    | |   |  |
==========---=---=--=-----------------------------------------=>
nnn000001000000SET START [no parameters, always starts data set]
nnn000002000000SET TITLE\M&T DATA ARCHIVE SET nnn [set title]
nnn000003000000SET NUMBER\[nnn(3 digit code assigned to this set)]
nnn000004000000SET NAME\[name of set]
nnn000005000000SET CITATION\[text - primary publication(s)]
nnn000006000000SET DESCRIPTION\[text describing this set]
nnn000007000000SET RUN\[mmm - run number]\[text - run name]
nnn000008000000SET DEFINITION\[stardard name]\[value]\[definition]
 .    .    .     .    .    .    .    .    .    .
nnn000034000000SET .    .    .    .    .    .    .
nnn000035000001SUB START [no parameters, always starts data subset]
nnn000036000001SUB TITLE\M&T DATA ARCHIVE SET nnn [set title]
nnn000037000001SUB NUMBER\[nnn(3 digit code assigned to this set)]
nnn000038000001SUB NAME\[name of set]
nnn000039000001SUB DEFINITION\[test name of set]
nnn000040000001SUB SOURCE\[text describing source of subset data]
nnn000041000001SUB MISSING VALUE\[value used for missing data]
nnn000042000001SUB FORMAT\[type - either FIXED or FREE]
nnn000043000001LIN GROUP TITLE\[subset title]
nnn000044000001LIN FORMAT\[Lnn]\[FORTRAN format for Lnn]
nnn000045000001LIN FIELD\[LnnFxx]\[name]\[units]\[format]\[text]
nnn000046000001SUB DATA [no parameters - indicates data to follow]
nnn000047mmm01Lnn [single line data record with format Lnn, variables
 .    .    .     are indexed as the xx'th value in the list as defined
 .    .    .     in a FIELD statement]
 .    .    .     .    .    .    .    .    .    .
 .    .    .     .    .    .    .    .    .    .
nnn000123000002SUB START [no parameters, always starts data subset]
nnn000124000002SUB TITLE\M&T DATA ARCHIVE SET nnn [set title]
 .    .    .     .    .    .    .    .    .    .
 .    .    .     .    .    .    .    .    .    .
nnn001267000000SET END [no parameters, indicates end of set]
==========---=---=--=-----------------------------------=>
        1111111111222222222233333333344444444445> Column
12345678901234567890123456789012345678901234567890> Numbers
==========---=---=--=-----------------------------=>
```

Figure 2. Use of key words in data map structure. Examples of entries are given in capital letters. Parameter contents are explained in lower case text enclosed in square brackets ([and]). The parameters occur in the archive without square brackets.

KEY WORD DEFINITIONS

The data map structure of the archive is achieved by use of the standard list of key words in a prescribed order. The previous section gave the order of usage for many of the key words. This section provides detailed definitions for the key words in terms of their usage in the archive. The reader should refer to Figure 2 and to the partial archive listings in Appendix C for examples of how each of these are used.

SET START--This must be used only once per set; it is always record number 000001. SET START is mandatory.

SET TITLE--This must be used only once per set; it is always record number 000002. It has one parameter, the standard title of the set within the archive. The wording of this title currently is M&T DATA ARCHIVE SET followed by a three-digit archive set number. SET TITLE is mandatory.

SET NUMBER--This must be used only once per set, it is always record number 000003. It has one parameter, the three-digit set number. SET NUMBER is mandatory.

SET NAME--This must be used only once per set; it is always record number 000004. It has one parameter, the common name of the set (for example, 'Hanford 64 S series'). SET NAME is mandatory.

SET DESCRIPTION--This may be used many times in the set. It has one parameter: a line of text describing the set. Several lines or paragraphs of text may be needed to describe the set. Each line of description will be preceded by the standard prefix and the key word SET DESCRIPTION.

SET CITATION--This may be used several times in the set. It has one parameter: a line of text which is part of the bibliographic citation to the set. Each line of the citation will be preceded by the standard prefix and the key word SET CITATION.

SET RUN--This is used to define the three-digit number assigned to each run within the set. The archive uses two parameters to designate runs, this number and the phrase used in the study to identify each run. This run number occurs in the record prefix. The phrase used in the study may occur in various locations within the archived data (as part if a table legend, a header, etc.). There must be one SET RUN key word for each run. The run number "000" is reserved to identify general items that do not apply to a specific run.

SET DEFINITION--This may be used several times in the set. It has three parameters: the standard name being defined, the value being defined, and the definition. It is used primarily for coded footnotes and/or remarks in the archived data. Consider the case where the data contain a single character 'H', 'M', or 'L' as a summary of wind speed in a field called SUMMARY. Elsewhere in the set citation document there is a definition:

H = average wind speed greater than 10 mph.
M = average wind speed between 5 and 10 mph.
L = average wind speed less than 5 mph.

These definitions are obviously not generic to the whole archive; they are set specific. They would be defined thus:

```
SET DEFINITION\SUMMARY\H\average wind speed greater than 10 mph.
SET DEFINITION\SUMMARY\M\average wind speed between 5 and 10 mph.
SET DEFINITION\SUMMARY\L\average wind speed less than 5 mph.
```

SET END--This signals the end of the set. It has no parameters. It occurs after the last data record in the last subset. SET END is mandatory.

SUB START--This is required at the start of each subset; it has no parameters.

SUB TITLE--This is required at the start of each subset. It has one parameter: the standardized title of the subset within the archive. The wording of the title currently is M&T DATA ARCHIVE SUBSET followed by a three-digit archive set number. SET TITLE is mandatory.

SUB NUMBER--This is required at the start of each subset. It has one parameter: the three-digit subset number.

SUB NAME--At least one SUB NAME record must appear in the data map for each subset. It has one parameter, the common name of the subset.

SUB DEFINITION--This is identical in function to the SET DEFINITION. It is used to define standard field names that are specific to the subset.

SUB SOURCE--This is required and has one parameter: a line of text describing how the subset was transferred to the archive. The primary purpose of this is to distinguish between data that were already on media and those that were keyed in from hard copy sources.

SUB MISSING VALUE--This key word is optional. It has one parameter, the missing value for the subset. Examples are:

```
SUB MISSING VALUE\0
SUB MISSING VALUE\ZERO
SUB MISSING VALUE\SPACE
SUB MISSING VALUE\SPACES
SUB MISSING VALUE\-99
```

It is possible that several missing value codes apply to the subset; thus, this data map key word may be repeated.

SUB FORMAT--This is required. It has one parameter, the text string 'FIXED', or 'FREE'. This applies to the entire subset.

LIN GROUP TITLE--This is used to identify a group of data lines by their logical name. It has one parameter. This usually will be the title of the table in the data. It may be a summarized title composed by the archivers.

LIN GROUP LINES--This identifies which lines or types of lines that follow the LIN GROUP TITLE. It has a variable number of parameters depending on which lines are in this group. The lines are identified by the letter 'L' and two digits. A sequential group of lines may be identified by the start line and end line connected by a dash. For example, lines 3 through 7 may be identified as

```
LIN GROUP LINES\L03\L04\L05\L06\L07
```

or

```
LIN GROUP LINES\L03-L07\
```

LIN FORMAT--This is a dual purpose item. It must be present for each line that is defined. It has two parameters, the first is the line number, the second is either 'FREE' or a FORTRAN format for a fixed-format line. The FORTRAN format must contain the opening and closing parentheses.

```
LIN FORMAT\L03\(1X,I4,5F8.3)
```

LIN FIELD--This defines the field within the line. It is required for each field. It has five parameters, the line and field numbers, the standard name of the field, the units, the FORTRAN format segment for this particular field, and the name used by the original experiment. The format segment may have two elements, the number of spaces offset to the field, and the field format. For example:

```
LIN FIELD\L02F01\SPEED    \M/SEC\10X,F5.2\wind speed
LIN FIELD\L04F01\REMARK   \SET DEFINITION\1X,A2\none
LIN FIELD\L04F02\AZIMUTH \DEGREES \14X,F5.1\azimuth degrees
LIN FIELD\L03F03\HEIGHT   \METERS  \43X,F5.2\sampler ht M
```

SUB DATA--This is required at the start of the data for the subset. It has no parameters. Because it is always the last record in the data map for a subset, it may be thought of as SUB MAP END.

SECTION 4

DATA ACCESS

The structure of the data map is designed so the information desired may be obtained automatically by a computer code without regard to the order and format of the data in a specific subset. The user may wish to use either a computer code on a standard programming language (FORTRAN, Pascal, etc.) or to input the data directly in a data base system. Allowances have been made in the design of the data map to allow either approach.

HOW TO USE THE ARCHIVE

This section provides guidance to the user on how the various parts of the archive are to be used to identify data of interest and then to extract those data.

General Approach

The archive is designed to allow scanning of the data sets at several levels of detail. Starting with the most general, the experiment summary tables in the data survey report (Woodruff and Glantz, 1985) allow the user to scan a large number of experiments relative to major characteristics.

As a result of this general characteristic scan, the user will have a list of experiments that may meet his needs. Included in this list may be some experiments that have not been incorporated into the archive; information is contained to aid in obtaining such data sets. If the demand is great enough, the data set may be incorporated into this archive.

The master tape for the M&T data archive contains files with printable copies of this report and the data set documentation reports for each of archived data sets. These reports are also available as formal EPA reports. The user should scan these reports to better define those experiments of interest within the archive.

Once a set has been selected, the next step is to obtain the data tape(s) for that data set. The data tape contains a file with a printable copy of the applicable data set documentation report. The standard experiment summary (SES) file and data map variable summary file may then be

scanned to check for inclusion of variables of interest. The archived data may also be scanned as part of the selection process.

For more specific information, the documentation files may be used. Narrative information on the experiments and data provides a better understanding of the nature of each experiment and data. Also, references to additional documentation are provided on each data set.

The archived data of interest then may be obtained from the archived sets using the data map structure. Although the data may be used directly in its archived form, the user should transfer a subset of data to custom-formatted files. The advantages of the transfer are that files of a more manageable size may be obtained and the data map only has to be used once to get the desired data.

Very careful data control and documentation of each step in data transfer are necessary to help ensure the accuracy of data placed in the archive. If possible, the data order and format within the archive should be such that a direct visual comparison can be readily made with original data listings.

Each data set is designed to contain sufficient documentation within the archived set so that the user can clearly understand what data are in the file. In addition, sufficient information is provided that supporting literature can be obtained if needed.

Sample FORTRAN Program

Appendix D contains a listing of a sample FORTRAN program that illustrates the manner in which data can be accessed using the data map information. This is a code designed merely to identify and retrieve data. Some archive error checking is also performed.

The user should note that only a portion of the documentation/mapping information is needed to access the data. This code could be expanded to use the additional data map information, which would greatly improve the utility of the program for accessing archived data. In its current form, this program provides the basis for a custom code to select and write data from the archives.

The alternative to developing a retrival program is the preparation of a mask or program for transferring the archived data sets into a computer-based data base systems. The data-mapping information will be best used with this approach.

Checksum Values

As part of the information in the archive, checksum values are given for both the odd and even character columns in the archive.

These checksum values are the sum of all printable ASCII values in the file with the exception of print control characters such as line feed and carriage return. The sums do not include the trailing blank characters on each line, in order that the checksum will apply both to blank filled and non-blank filled files.

The user should use the checksum values to ensure that the integrity of the data archive has been maintained in the transport and loading of the data onto his computer system.

MANAGEMENT AND MAINTENANCE

The M&T data archive is managed and maintained by EPA. Questions, corrections, or comments concerning the archive should be directed to

U.S. Environmental Protection Agency
Atmospheric Science Research Laboratory
Meteorology Assessment Division
Research Triangle Park, North Carolina 27711

Each archive set is assigned a version number. A new version number is assigned whenever the archive is updated, enlarged, or corrected. The user should always be certain that the most recent version has been obtained.

As data sets are added to the M&T data archive the files on the master tape will be updated to include the new documentation files.

REFERENCES

1. Glantz, C. S., R. K. Woodruff, and J. G. Droppo. The Hanford 1964 Atmospheric Dispersion Experiment, EPA-600/3-85/055, 1985.

2. Woodruff, R. K., J. G. Droppo, and C. S. Glantz. The Minnesota 1973 Atmospheric Boundary Layer Experiment, EPA-600/3-85/0/4, 1985.

3. Woodruff, R. K., and C. S. Glantz. Survey of Meteorological and Tracer Data for Demonstrting a Data Archive. EPA-600/3-85/052, 1985.

APPENDIX A

QUALITY ASSURANCE PROCEDURES

The quality assurance required to verify and document the accuracy of the data entered in the archive is described in this section. The procedures for entering data sets, documentation, and archive usage are outlined. The procedures presented elsewhere in this report for these processes provide the framework of quality assurance procedures for archiving.

Quality assurance covers both bookkeeping and decision processes. The former is mainly the formalized mechanics for documenting the steps in the data archiving processes. The latter involves the use of qualified personnel to ensure proper formulation and definition of the archive.

The documents/products described in detail elsewhere in this report that are generated in the archiving of each data set are

1. Notebook
2. Original Data Tape
3. Original Data Hard Copy Listings (Item 2 contents)
4. Archival Data Tape
   a. Documentation Files
   b. Data Files
5. Data Set Documentation Report (Hard copy of Item 4a)
6. Hard Copy Listings of Contents of Archival Data Tape

Each of the steps in the data archiving process should be recorded in the notebook along with dates and names. Any problems or questions should be entered as they are encountered. The notebook becomes a source of input to the documentation files in Item 4 at the final stages of the archiving process.

The entry of data into the archive requires steps to assure the accurate replication of original data. In the sample procedures given in the following sections, duplicate data transfer is recommended for data transfer processes that could corrupt data integrity. A machine comparison of the duplicate files provides a check for possible data transfer errors. In addition, it is very important that visual checks be made of the data at each stage of data transfer to ensure that the data are correct, complete, and in the correct order.

Copies of all of these items are to be stored in a quality assurance file for a reasonable period following the archiving process. Should questions or problems arise with the archive, this file provides a means to rapidly check the archive.

The definition of a reasonable period for storage of all items depends partly on the importance of maintaining a specific data set. In general, a period of two years is recommended for storage of these items. This is considered a reasonable time period for the restarting of a specific archiving activity. After two years, the data tapes should be released from the quality assurance file. The other items may be maintained for an extended period beyond the two years.

Tape storage beyond several years will require maintenance of tape files. Archiving procedures for long-term tape storage will depend on the tape library facility selected.

Items 4 and 5 are the archive. Item 4 should be placed in an EPA tape library for long-term storage and maintenance Copies should be distributed from this tape. Item 5 should be submitted to National Technical Information Service (NTIS) for distribution.

The data structures, definitions, assumptions, problems, limitations, publications, and revision records are documented in Item 4a. The structure of the data within the archive are as near to that of the original tables (in publications, reports, notebooks, or field notes) as possible to help verify data both in the final stages of the archiving process and during use of archival data.

DATA ENTRY PROCEDURES

The process of entering the data depends partly on the form and format of the data. The required data entry, data verification, and documentation procedures are detailed below.

Data in notebooks, reports, and publications that are not available in computer format--

Several approaches may be taken to entering the data depending both on the nature of the data and the available facilities. Sample procedures are given below for several entry options.

Microcomputer Entry--

1. enter tabular data using a data base program
2. check data entries visually for completeness and accuracy
3. output data into delimited format files
4. verify data entry using listings by second party
5. correct files and repeat step 4, if necessary
6. transfer two copies of delimited files to mainframe or minicomputer

7. compare duplicate files for transmission error; correct as required based on original data copy
8. append data to archival data files

Keypunch Data Entry--

1. enter data from tables to cards or computer file
2. verify data entry
3. correct files, as necessary
4. visually check data entries for completeness and accuracy
5. append data to archive data files

Data on magnetic tape/cards/paper tape that duplicate hard copy original tables--

1. read data into computer
2. visually check data for completeness and accuracy
3. output data into delimited format files
4. repeat steps 1, 2, and 3
5. run compare program on two sets of files
6. resolve and correct as needed for any differences between the files
7. append data to archival data files

Similar steps should be developed for other formats of data using the duplicate entry/copy procedure for data verification.

APPENDIX B

ARCHIVE STATUS

BACKGROUND

The M&T data archive status as of date of the most recent version of this report is given in this appendix. The user should contact the U.S. Environmental Protection Agency to obtain the current status of the archive.

The initial effort involved the archiving of two data sets to illustrate and test the archive structure and procedures. These two sets were identified as the Minnesota 1973 and Hanford 1964 Series. They were assigned archive numbers of 001 and 002, respectively.

DATA SET SUMMARIES

The M&T data archive sets are summarized in Table B-1. The DSFS tables for these archived data sets are given in Figures B-1 and B-2. Additional details may be obtained on each set from the cited individual documentation reports.

TABLE B-1. LIST OF M&T DATA ARCHIVE SETS

Archive Set Number	Revision Number	Name of Archived Data Set	Data Archive Report Number	Documentation Date
001	001	MINNESOTA 1973 ATMOSPHERIC BOUNDARY LAYER EXPERIMENT	EPA-600/	6-5-85
002	001	THE HANFORD 1964 ATMOSPHERIC DISPERSION EXPERIMENT	EPA-600/	6-5-85

DATA SET FACT SUMMARY

Archive Set Title: M&T DATA ARCHIVE SET 001

Experiment Type: Micrometeorological, planetary boundary layer, surface boundary layer.

Name: Minnesota 1973.

Purpose: To make measurements of 1) the vertical fluxes of momentum and heat and 2) profiles of wind velocity and temperature within the planetary boundary layer.

Location: Northwestern Minnesota.

Time: Late summer, 1973.

Number of Tests: 11

Nature of Experiment: A full-scale measurement program over flat, smooth terrain to measure turbulent fluxes at multiple levels from a 32-m tower and a tethered balloon.

Meteorological Conditions: Fully developed stationary convective periods. Mixing depths to approximately 2300 m.

Meteorological Measurements:
- Mean profiles of winds and temperatures.
- Fluctuations of three wind components and temperatures.

Measurement Methods:
- Tower
- Tethered balloon
- Rawinsondes

Figure B-1. Data Set Fact Summary Form For Archive Set Number 001

Data Set Fact Summary

Archive Set Title: M&T DATA ARCHIVE 002

Experiment Type: Atmospheric dispersion, tracer, planetary boundary layer

Name: Hanford 1964, Hanford 1964, or Hanford S Series

Purpose: To examine the dispersion of a particulate tracer under stable atmospheric conditions

Location: Southeastern Washington State; on the U.S. government's Hanford Reservation

Time: Spring and summer, 1964

Number of Tests: 15; the results of 14 are published

Nature of Experiment: Tracer dispersion experiments conducted over relatively flat terrain. The tracer (ZnS) was released from a location on a 121.9-m (400-ft) tower and sampled on a number of arcs arrayed between 200 m and 12,800 m from the release tower. Sampling was conducted at approximately ground level (1.5 m above ground level) and on as many as 20 sampling towers.

Meteorological Condisions: Nighttime tracer releases with generally stable atmospheric stabilities.

Meteorological Measurements: Wind speed and direction, the standard deviation of the wind direction, and temperature were all measured at eight levels on a 121.9-m (400 ft) tower. Similar measurements at six levels on an 24.4-m (80 ft) portable mast were made during three of the experiments.

Measurement Methods: Filter samplers were deployed on the arcs at 1.5 m above ground level and on sampling towers at various heights.

Figure B-2. Data Set Fact Summary Form For Archive Set Number 002

APPENDIX C

DATA ARCHIVE EXAMPLES

PARTIAL LISTING OF ARCHIVE DATA SET 1 (MINNESOTA 1973)

```
0010000010000OSET START
0010000020000OSET TITLE\M&T Data Archive Set 001, Revision 001
0010000030000OSET NUMBER\001
0010000040000OSET NAME\MINNESOTA 1973 ATMOSPHERIC BOUNDARY LAYER EXPERIMENT
0010000050000OSET CITATION\IZUMI AND CAUGHEY,1973
0010000060000OSET DESCRIPTION\A full-scale measurement program over a
0010000070000OSET DESCRIPTION\flat smooth terrain measuring turbulent
0010000080000OSET DESCRIPTION\fluxes at multiple levels from a 32 m tower
0010000090000OSET DESCRIPTION\and a tethered balloon.
0010000100000OSET RUN\001\2A1
0010000110000OSET RUN\002\2A2
0010000120000OSET RUN\003\3A1
0010000130000OSET RUN\004\3A2
0010000140000OSET RUN\005\5A1
0010000150000OSET RUN\006\6A1
0010000160000OSET RUN\007\6A2
0010000170000OSET RUN\008\6B1
0010000180000OSET RUN\009\7C1
0010000190000OSET RUN\010\7C2
0010000200000OSET RUN\011\7D1
0010000210000 1SUB START
0010000220000R01SUB TITLE\M&T Data Archive Set 001 - Subset 001
0010000230000 1SUB NUMBER\001
0010000240000 1SUB NAME\Minnesota 1973 Atmospheric Boundary Layer Experiment
0010000250000 1SUB MISSING VALUE\NONE
0010000260000 1SUB SOURCE\PUBLISHED, TABLE 1 (IZUMI AND CAUGHEY,1973,P15)
0010000270000 1SUB FORMAT\FIXED
0010000280000 1SUB FORMAT\L00\(A120)
0010000290000 1LIN GROUP TITLE\Run Summary
0010000300000 1LIN GROUP LINES\L00\L01
0010000310000 1LIN FORMAT\L01\(I2,A4,1X,3I5,I3,F6.2,F5.2,I6,2I5,I4,2F4.2)
```

```
0010000320000 1LIN FIELD L01F01 TABLE      NO UNITS 1X,I1        Document table number
0010000330000 1LIN FIELD L01F02 RUN        NO UNITS 2X,A4        Run number
0010000340000 1LIN FIELD L01F03 DATE       YRMODA   6X,I7        Year,Month,Day
0010000350000 1LIN FIELD L01F04 TIMESTART  CDT      13X,I5       Start time for experiment
0010000360000 1LIN FIELD L01F05 TIMESTOP   CDT      18X,I5       Stop time for experiment
0010000370000 1LIN FIELD L01F06 HGTZMAX    M        23X,I5       Ht of highest MRU probe
0010000380000 1LIN FIELD L01F07 USTAR      M/S      28X,I3       Friction velocity
0010000390000 1LIN FIELD L01F08 QSUBO      C CM/S   31X,F6.2     Qo surface heat flux
0010000400000 1LIN FIELD L01F09 TSTAR      C        37X,F5.2     T*, scaling temperature
0010000410000 1LIN FIELD L01F10 MOL        CM       42X,I6       L Monin-Obukhov Length
0010000420000 1LIN FIELD L01F11 HGTZI      M        48X,I5       Zi PBL height from raws
0010000430000 1LIN FIELD L01F12 ZIOMOL     NONDIMEN 53X,I5       Zi/L stability parameter
0010000440000 1LIN FIELD L01F13 WSTAR      CM/S     58X,I4       W*
0010000450000 1LIN FIELD L01F14 TSCALE     C        62X,F4.2     (THETA)o
0010000460000 1LIN FIELD L01F15 RATIO1     NONDIMEN 66X,F4.2     U*/(f Zi)
0010000470000 1SUB DATA
0010000480010 1L01  1 2A1  730910 1217 1332 1219 45 19.58 -.43 -4166 1250  -30 200 .10 3.32
0010000490020 1L01  1 2A2  730910 1332 1447 1219 45 20.94 -.46 -3804 1615  -42 223 .09 2.55
0010000500030 1L01  1 3A1  730911 1510 1625  610 37 18.60 -.50 -2395 2310  -96 241 .08 1.47
0010000510040 1L01  1 3A2  730911 1625 1740  610 32 11.62 -.36 -2430 2300  -95 206 .06 1.27
0010000520050 1L01  1 5A1  730915 1622 1737  610 18  6.88 -.39  -711 1085 -153 135 .05 1.50
0010000530060 1L01  1 6A1  730917 1401 1516 1219 24 20.97 -.88  -572 2095 -366 243 .09 1.04
0010000540070 1L01  1 6A2  730917 1516 1631 1219 23 16.16 -.71  -643 2035 -316 221 .07 1.03
0010000550080 1L01  1 6B1  730917 1652 1807 1219 26  7.16 -.27 -2270 2360 -104 177 .04 1.03
0010000560090 1L01  1 7C1  730919 1415 1530  610 28 22.10 -.79  -878 1020 -116 195 .11 2.52
0010000570100 1L01  1 7C2  730919 1530 1645  610 30 18.12 -.60 -1311 1140  -87 189 .10 2.41
0010000580110 1L01  1 7D1  730919 1650 1805  610 25  9.89 -.40 -1352 1225  -91 158 .06 1.85
0010000581000 2SUB START
```

PARTIAL LISTING OF ARCHIVE DATA SET 002 (HANFORD 1964)

```
0020000010000OSET START
0020000020000OSET TITLE\ M&T Data Archive Set 002, Revision 001
0020000030000OSET NUMBER\002
0020000040000OSET NAME\Hanford 1964 Series
0020000050000OSET CITATION\Hanford Atmospheric Dispersion Data: 1960 Through
0020000060000OSET CITATION\JUNE 1967.  P.W. Nickola, J.V. Ramsdell, C.S. Glantz,
0020000070000OSET CITATION\R.E. Kerns.  NUREG/CR-3456. PNL-4814.
0020000080000OSET DESCRIPTION\The Hanford '64 series is one of a series of atmospheric dispersion
0020000090000OSET DESCRIPTION\experiments that have been conducted at, what is now, the  U.S.
0020000100000OSET DESCRIPTION\Department of Energy's Hanford Reservation.  The reservation is
                  located
0020000110000OSET DESCRIPTION\in southeastern Washington State.  The terrain at Hanford is
                  reasonably
0020000120000OSET DESCRIPTION\flat and the climate is semi-arid.  The vegetation is dominated by
0020000130000OSET DESCRIPTION\sagebrush and steepe grasses.  The '64 series, also called the
0020000140000OSET DESCRIPTION\"S series", was conducted in the spring and summer of 1964.  Releases
0020000150000OSET DESCRIPTION\were made at night, under stable atmospheric conditons.  Zinc
                  Sulfide,
0020000160000OSET DESCRIPTION\a fluorescent pigment, was used as the tracer in each experiment.
0020000170000OSET DESCRIPTION\Ground level sampling was conducted on arcs between 200 and 12800 m
0020000180000OSET DESCRIPTION\downwind of the release.  Tower sampling was conducted on
0020000190000OSET DESCRIPTION\several of the arcs.  All releases were elevated releases.
0020000200000OSET DESCRIPTION\Meteorological data was collected on a 400 ft tower that
0020000210000OSET DESCRIPTION\is instrumented at several levels to measure temperature and
0020000220000OSET DESCRIPTION\wind parameters.
0020000230000OSET RUN\001\S-64-1
0020000240000OSET RUN\002\S-64-2
0020000250000OSET RUN\003\S-64-4
0020000260000OSET RUN\004\S-64-5
0020000270000OSET RUN\001\S-64-6
0020000280000OSET RUN\002\S-64-7
0020000290000OSET RUN\003\S-64-8
0020000300000OSET RUN\004\S-64-9
0020000310000OSET RUN\001\S-64-10
0020000320000OSET RUN\002\S-64-11
0020000330000OSET RUN\003\S-64-12
```

```
002000034000000SET RUN\004\S-64-13
002000035000000SET RUN\001\S-64-14
002000036000000SET RUN\002\S-64-15
002000037000000SET DEFINITION\TRACER\FP\Tracer Flourescent Pigment 2210
002000038000000SET DEFINITION\REMARKS\E\ESTIMATED values
002000039000000SET DEFINITION\REMARKS\H\DOA (dead on arrival), HOT.  At time of filter pickup,
                   vacuum
002000040000000SET DEFINITION\\\supply to filter was found to have failed due to dead engine.
                   Engine hot,
002000041000000SET DEFINITION\\\however, indicating vacuum missing only a short time and hence
                   likely
002000042000000SET DEFINITION\\\a valid sample.
002000043000000SET DEFINITION\REMARKS\W\DOA, WARM.  Same as H, except engine only warm to touch.
                   Possibly
002000044000000SET DEFINITION\\\valid sample, but more doubt than with H.
002000045000000SET DEFINITION\REMARKS\C\DOA, COLD.  Same as H, except engine cold to touch, and no
                   fuel in
002000046000000SET DEFINITION\\\tank.  Sampling occurred as long as fuel lasted, but ended
                   considerably
002000047000000SET DEFINITION\\\before filter pickup.
002000048000000SET DEFINITION\REMARKS\P\DOA, cold, PARTIAL tank of gasoline.  Sampling likely of
                   short duration.
002000049000000SET DEFINITION\REMARKS\X\DOA, cold, full tank.  engine failed shortly after
                   starting.  Sample
002000050000000SET DEFINITION\\\ is essentially due to impaction on filter rather than flow through
                   filter.
002000051000000SET DEFINITION\REMARKS\C\DOA, other.  Engine DOA, but no other field note given.
002000052000000SET DEFINITION\REMARKS\I\IMPACTION sample.  Engine for vacuum was never started.
                   Sample
002000053000000SET DEFINITION\\\ is due to impaction on filter rather than flow through filter.
002000054000000SET DEFINITION\REMARKS\L\Filter lost.
002000055000000SET DEFINITION\REMARKS\M\Filter was MISSING from holder assembly.  The supporting
                   crepe paper
002000056000000SET DEFINITION\\\roll was oftern assayed for the ZnS tracer, but the paper is a much
                   less
002000057000000SET DEFINITION\\\efficient sampler thean the membrane filter.
002000058000000SET DEFINITION\REMARKS\D\Filter assembly DROPPED.  Effect unknown.
002000059000000SET DEFINITION\REMARKS\S\Filter SLIGHTLY torn.  Effect likely minimal.
002000060000000SET DEFINITION\REMARKS\T\Filter TORN Badly.  Effect likely significant.
```

```
0020000610000OSET DEFINITION\REMARKS\F\Apparent FINGERTPRINT on filter.  Time of placement and
                 effect, if any,
0020000620000OSET DEFINITION\REMARKS\\\unknown.
0020000630000OSET DEFINITION\REMARKS\R\For Rankin counting of ZnS, a RECOUNT of a filter with an
                 unexpected
0020000640000OSET DEFINITION\REMARKS\\\mass assessment, but with essentially unchanged mass
                 indicated on the
0020000650000OSET DEFINITION\REMARKS\repeat assessment.
0020000660000OSET DEFINITION\REMARKS\Z\Any other field or assessment remark
0020000670000OSET DEFINITION\REMARKS\#\Visible dust on filter.  Less than 5 is of minimal
                 importance.  Larger
0020000680000OSET DEFINITION\REMARKS\\\numbers indicate greater dust loadings on the filter.
0020000690000 1SUB START
0020000700001SUB TITLE\M&T Data Archive Set 002 - Subset 001
0020000710000 1SUB NUMBER\001
0020000720000 1SUB NAME\Hanford 1964 S series Table 3 page 25-27
0020000730000 1SUB MISSING VALUE\0
0020000740000 1SUB SOURCE\PUBLISHED, ENTERED IN FIXED FORMAT BELOW, See page 25-27.
0020000750000 1SUB FORMAT\FIXED
0020000760000 1LIN GROUP TITLE\General Grid, Source, Release and Metereological Information
0020000770000 1LIN GROUP 00001LINES\L01
0020000780000 1LIN FORMAT\L01\(A8,1x,A1,1x,F3.1,A1,F5.3,I4,1X,A2,I3,I5,I6,I3,f7.0)
0020000790000 1LIN FIELD\L01F01\RUN      \NO UNITS\A8          \Experiment run number in S series
0020000800000 1LIN FIELD\L01F02\GRIDSOURC\NO UNITS\9X,A1       \Grid Source ( U = unstable, S =
                 stable)
0020000810000 1LIN FIELD\L01F03\USPEED   \M/S     \11X,F3.1    \Wind speed (m/s), at 1.5m (2.0m if
                 asterisk flag
0020000820000 1LIN FIELD\L01F04\NOTE     \NO UNITS\14X,A1      \Asterisk indicates speed at 2.0
                 meters
0020000830000 1LIN FIELD\L01F05\STABILTY \NO UNITS\15X,F5.3    \Richardson number-- Ri sub b
0020000840000 1LIN FIELD\L01F06\HGTRELEAS\M       \20X,I4      \Release Height (m)
0020000850000 1LIN FIELD\L01F07\TRACER   \NO UNITS\25X,A2      \Type of Tracer
0020000860000 1LIN FIELD\L01F08\DURATION \MIN     \27X,I3      \Duration of Release
0020000870000 1LIN FIELD\L01F09\DISTINNER\M       \30X,I5      \Sampling Distance from Source,m -
                 Nearest arc
0020000880000 1LIN FIELD\L01F10\DISTOUTER\M       \35X,I6      \Sampling Distance from Source,m -
                 Farthest arc
0020000890000 1LIN FIELD\L01F11\TOWERNUM \NO UNITS\41X,I3      \Total number of Towers Active
0020000900000 1LIN FIELD\L01F12\QTOTAL   \G       \44X,F7.0    \grams of tracer released
```

```
00200009100001SUB DATA
00200009200001L01 S-64-1  S 1.9* .066  56 FP 38 0200 12800 20  4000.
00200009300001L01 S-64-2  S 1.3* .182  56 FP 26 0200 12800 20  4000.
00200009400001L01 S-64-4  S 1.0* .250  56 FP 26 0200 12800 20  1930.
00200009500001L01 S-64-5  S 1.9* .170  56 FP 32 1600 12800 10  4000.
00200009600001L01 S-64-6  S 1.0*    0  56 FP 20 1600 12800 10  2000.
00200009700001L01 S-64-7  S 2.8* .070  56 FP 30 0200  3200 20  2880.
00200009800001L01 S-64-8  S 0.8* .146  56 FP 60 1600 12800 10  1280.
00200009900001L01 S-64-9  S 1.4* .241  56 FP 60 1600 12800 10  1708.
00200010000001L01 S-64-10 S 2.4  .079  56 FP 60 1600 12800 10  1600.
00200010100001L01 S-64-11 S 1.2  .518  56 FP 21 1600 12800 10   845.
00200010200001L01 S-64-12 S 1.5* .232  56 FP 57 1600 12800 10  1980.
00200010300001L01 S-64-13 S 1.1* .348 111 FP 72 1600 12800 10  2000.
00200010400001L01 S-64-14 S 2.2* .053 111 FP 40 1600 12800  0  1200.
00200010500001L01 S-64-15 S 1.2  .902 111 FP 46 1600 12800 10  1500.
```

APPENDIX D

ACCESS - A FORTRAN CODE ILLUSTRATING DATA ACCESS

The following FORTRAN program, ACCESS.FOR, is provided to illustrate the manner in which a computer program may be used to access the archived data. This code when complied and run on your computer should give a listing of the contents on any of the M&T data archive sets. The only input parameter is the name of the file containing the archived data. Output goes to the terminal for interactive execution, and to the default output file for batch execution.

This program outputs a line of information for each data value in the archive. The line contains the record number, the parameter name, units, description, and the value of the parameter. Since the output of the entire contents of an archive using this program will result in a very long listing, the number of records have been limited to 250 on line 32 in this version (ILIM = 250).

This code is provided as a starting point for the user to access the archived data. Additional file handling, logic and write statements will need to be added by the user.

```
C       PROGRAM ACCESS.FOR
C       VERSION:  850601-005
C       M&T DATABASE -  TEST READ PROGRAM
C       LANGUAGE: MICROSOFT FORTRAN
C       COMPUTER: IBM PC  / SPERRY-UNIVAC
C       AUTHOR(S) JG DROPPO 3-85, 6-85, JS IRWIN 5-85C
C       PROGRAM GETS AND LISTS DATA
C       DIMENSION   IDELPE(5),IDELPX(5),IDELF(5)
      CHARACTER*1 HD1(17),INFO1(81),CREC1(6),LLET,FLET
      CHARACTER*2 SUBN,PPOS(20,20)
      CHARACTER*2 PPOSI,PFORM,FNAME,LTYPE
      CHARACTER*3 SETN,RUNN,STRG,LINETY(6)
      CHARACTER*3 CODE(14),LNAME
      CHARACTER*6 RECN,CREC
      CHARACTER*8 PUNIT(20,20),PUNITS
      CHARACTER*9 PNAM(20,20),PNAME
      CHARACTER*12 PFRMT(20,20),PFORMT
      CHARACTER*17 HD
      CHARACTER*30 PDES(20,20),PDESPE,PDESPX
      CHARACTER*78 FVALUE,FVAL(20)
      CHARACTER*81 INFO
```

```
      EQUIVALENCE  (HD,HD1(1)),(INFO,INFO1(1))
      EQUIVALENCE  (HD1(1),SETN),(HD1(4),RECN),
     1 (HD1(10),RUNN), (HD1(15),LNAME)
     1,(HD1(13),SUBN),(HD1(16),LTYPE),(CREC,CREC1(1))
     2,(HD1(15),LLET)
      EQUIVALENCE (INFO1(2),STRG),(INFO1(9),FLET)
      EQUIVALENCE (INFO1(10),FNAME),(INFO1(13),FVALUE)
      EQUIVALENCE (INFO1(9),PFORM),(INFO1(12),PPOSI)
     1,(INFO1(15),PNAME),(INFO1(25),PUNITS),(INFO1(35)
     2,PDESPE),(INFO1(34),PFORMT),(INFO1(47),PDESPX)
C     DELIMITER POSITIONS 1-FIELD,2-FORMAT
      DATA IDELPE/7,14,24,33,34/
      DATA IDELPX/7,14,24,33,46/
      DATA IDELF/8, 0, 0, 0,0/
C
C     ==================
C     = OPEN INPUT FILE =
C     ==================
C
      OPEN(1,FILE=' ',STATUS='OLD')
C
C     ============================
C     = DEFINE DATA MAP KEY WORDS =
C     ============================
C
        LINETY(1)='SET'
        LINETY(2)='SUB'
        LINETY(3)='LIN'
        CODE(1)='STA'
        CODE(2)='TIT'
        CODE(3)='NUM'
        CODE(4)='CIT'
        CODE(5)='RUN'
        CODE(6)='MIS'
        CODE(7)='DAT'
        CODE(8)='DES'
        CODE(9)='DEF'
        CODE(10)='FIE'
        CODE(11)='FOR'
C     INT FLAGS AND COUNTERS
        IREC=0
        IRD=0
        JFM=0
        IPM=0
        MDE=0
C     SET NUMBER OF RECORDS TO BE LISTED, ILIM
        ILIM=250
C
C     ============================
C     = START DATA ACCESS PROCESS =
C     ============================
C
```

```
1     CONTINUE
C
C     ------------------------
C     -READ LINE FROM ARCHIVE-
C     ------------------------
C
      CALL READC(HD,INFO,IRD)
C
C     ====================
C     =CHECK RECORD NUMBER=
C     ====================
C
      IREC=IREC+1
      WRITE(CREC,'(I6)')IREC
      IF(IRD.EQ.0) THEN
         DO 100 K=1,5
         IF (CREC1(K).EQ.' ') CREC1(K)='0'
100      CONTINUE
         IF(CREC.NE.RECN) IRD=1
         IF(IREC.GT.ILIM) IRD=12
         IF(IRD.NE.0) GO TO 999
         IF(MDE.EQ.0) THEN
C
C           ====================
C           = SEARCH INPUT MODE =
C           ====================
C
            IF(STRG.EQ.CODE(11).AND.FLET.EQ.'F') THEN
C
C              IF CONDITION IS TRUE,
c              WE HAVE STARTED A NEW SUBSET
C              JFM = 0
               IPM = 0
               WRITE(*,3000)
3000           FORMAT(1X,'Starting a SUB SET')
               DO 110 I=1,20
                  DO 105 J=1,20
                     PPOS(I,J) = '-9'
 105              CONTINUE
 110           CONTINUE
               CALL FORTYP(FNAME,IFORM)
            ENDIF
            IF(STRG.EQ.CODE(11)) THEN
C              FORMAT
               IF(FLET.EQ.'L') THEN
                  CALL DELIM(IDELF,INFO1,IRD)
                  IF(IRD.NE.0) GO TO 999
                  READ(FNAME,'(I2)') JFM
                  IF(JFM.GT.0) THEN
                     IF(JFM.GT.20.OR.JFM.LT.1) THEN
                        IRD=9
                        JFM=1
```

```
                        GO TO 999
                     ELSE
                        FVAL(JFM)=FVALUE
                     ENDIF
                  ENDIF
               ENDIF
            ENDIF
            IF(STRG.EQ.CODE(10)) THEC
               PARAMETER DEFINITION
               IF(IFORM.EQ.1) THEN
                  CALL DELIM(IDELPX,INFO1,IRD)
                  IF(IRD.NE.0) GO TO 999
                  READ(PFORM,'(I2)') JFM
                  READ(PPOSI,'(I2)') IPM
                  IF(IPM.GT.20.OR.IPM.LT.1) IRD = 11
                  IF(IRD.NE.0) GO TO 999
                  PNAM(JFM,IPM) = PNAME
                  PPOS(JFM,IPM) = PPOSI
                  PUNIT(JFM,IPM) = PUNITS
                  PFRMT(JFM,IPM) = PFORMT
                  PDES(JFM,IPM) = PDESPX
               ELSE
                  CALL DELIM(IDELPE,INFO1,IRD)
                  IF(IRD.NE.0) GO TO 999
                  READ(PFORM,'(I2)') JFM
                  READ(PPOSI,'(I2)') IPM
                  IF(IPM.GT.20.OR.IPM.LT.1) IRD=11
                  IF(IRD.NE.0) GO TO 999
                  PNAM(JFM,IPM)=PNAME
                  PPOS(JFM,IPM)=PPOSI
                  PUNIT(JFM,IPM)=PUNITS
                  PDES(JFM,IPM)=PDESPE
               ENDIF
            ENDIF
            IF(STRG.EQ.CODE(7)) THEN
C              DATA - SWITCH TO DIM MODE
               MDE=1
            ENDIF
         ELSE
C
C           ====================
C           =  DATA INPUT MODE  =
C           ====================
C
            IF(LLET.EQ.'L') THEN
C              INPUT/LIST DATA
                IF(IFORM.EQ.1) CALL FXLIST(IREC,INFO,
     1          LTYPE,PPOS,PNAM,PUNIT,PFRMT,PDES,IRD)
                IF(IFORM.EQ.2) CALL FRLIST(IREC,INFO1,
     1          LTYPE,PNAM,PUNIT,PDES,IRD)
                IF(IRD.NE.0) GO TO 999
             ELSE
```

```
C               END OF DATA - SWITCH TO SIM MODE
                MDE=0
              ENDIF
            ENDIF
          ENDIF
C
C     ====================================
C     = IF ERROR - PRINT MESSAGE AND STOP =
C     ====================================
C
999     CONTINUE
        IF(IRD.NE.0) THEN
          CALL MASSAG(CREC,RECN,IRD)
          CLOSE(2)
          CLOSE(1)
          STOP
        ENDIF
        GOTO 1
        END
        SUBROUTINE READC(HD,INFO,IRD)
C
C       This reads in one line of data. JGD 2/85
C
        CHARACTER*17 HD
        CHARACTER*81 INFO
        IRD=0
        READ(1,1000,END=98,ERR=99) HD,INFO
        RETURN
98      IRD=2
        RETURN
99      IRD=3
        RETURN
1000    FORMAT(A17,A81)
        END
        SUBROUTINE MASSAG(CREC,RECN,IRD)
C
C       This contains error messages indexed to IRD.
C       JGD 4/85
C
        CHARACTER*6 CREC,RECN
        IF (IRD.EQ.1) WRITE(*,1001) CREC,RECN
        IF (IRD.EQ.2) WRITE(*,1002) CREC,RECN
        IF (IRD.EQ.3) WRITE(*,1003) CREC,RECN
        IF (IRD.GT.8) WRITE(*,1050) CREC,IRD
        IF (IRD.EQ.9) WRITE(*,1009)
        IF (IRD.EQ.10) WRITE(*,1010)
        IF (IRD.EQ.11) WRITE(*,1011)
        IF (IRD.EQ.12) WRITE(*,1012)
      IF(IRD.EQ.13) WRITE(*,1013)
        RETURN
1001    FORMAT(1X,A6,': BAD RECORD NUMBER (',A6,')')
1002    FORMAT(1X,A6,': END OF FILE READ  (',A6,')')
```

```
1003    FORMAT(1X,A6,': READ ERROR        (',A6,')')
1050    FORMAT(1X,A6,': ERROR CODE = ', I6)
1009    FORMAT(1X,' FORMATS EXCEED LIMIT OF 20 ')
1010    FORMAT(1X,' DELIMITER POSITION ERROR')
1011    FORMAT(1X,' TOO MANY VALUES PER LINE' )
1012    FORMAT(1X,' COMPLETED LISTING LIMIT  ')
1013    FORMAT(1X,' ERROR IN DECIPHERING FORMAT')
        END
        SUBROUTINE DELIM(I5,INFO1,IRD)
C
C       This checks for proper delimiter symbol (\)
C       in up to five positions in the input line.
C       JGD 4/85
C
        CHARACTER*1 INFO1(81)
        DIMENSION I5(5)
        DO 10 I = 1,5
                IP=I5(I)
                IF(IP.NE.0) THEN
                   IF (INFO1(IP).NE.'\') IRD = 10
                ENDIF
10      CONTINUE
        RETURN
        END
        SUBROUTINE FORTYP(FNAME,IFORM)
        CHARACTER*2 FNAME
C
C           DEFINE FORMAT TYPE AS
C           FIXED OR FREE
C
            IF(FNAME.EQ.'IX') IFORM = 1
            IF(FNAME.EQ.'RE') IFORM = 2
C
C           IFORM = 1 EQ. FIXED FORMATS
C           IFORM = 2 EQ. FREE FORMAT
C
            RETURN
            END
        SUBROUTINE BREAK(IC1,IC2,ICN,INFO1,IRD)
C
C       This defines the data positions in the input
C       string basen on separation by spaces, -, \,
C       or commas. JGD 4/85
C
C       ICN-NO OF VALUES,
C       ICM-MODE OF SEARCH,
C       IC1-START,
C       IC2-STOP
C
        DIMENSION IC1(20),IC2(20)
        CHARACTER*1 INFO1(81)
        LOGICAL DELM
```

```
      ICN=1
      ICM=0
      DO 100 IC=1,81
            DELM=(INFO1(IC).EQ.' '.OR.INFO1(IC)
     1      .EQ.','.OR.INFO1(IC).EQ.'-'.OR.
     2      INFO1(IC).EQ.'\')
          IF(ICM.EQ.0) THEN
                  IF(.NOT.DELM) THEN
                        IC1(ICN)=IC
                        ICM=1
                  ENDIF
            ELSE
                  IF (DELM) THEN
                        IC2(ICN)=IC-1
                        ICN=ICN+1
                        ICM=0
                        IF(ICN.GT.20) THEN
                              ICN=20
                              IRD=11
                        ENDIF
                  ENDIF
            ENDIF
100   CONTINUE
      ICN=ICN-1
      RETURN
     END
     SUBROUTINE FRLIST(IREC,INFO1,LTYPE,PNAM,
     1                 PUNIT,PDES,IRD)
C
C   FOR FREE FORMAT DATA FILES
C   DEFINES BEGINNING AND END OF FIELDS
C   LIST VALUES DETERMINED FOR ALL FIELDS
C
      DIMENSION IC1(20),IC2(20)
      CHARACTER*1 INFO1(81)
      CHARACTER*2 LTYPE
      CHARACTER*8 PUNIT(20,20)
      CHARACTER*9 PNAM(20,20)
      CHARACTER*30 PDES(20,20)
C     INPUT/LIST DATA
      CALL BREAK(IC1,IC2,ICN,INFO1,IRD)
      IF(IRD.EQ.0) THEN
           READ(LTYPE,'(I2)') JFM
           WRITE(*,1002)
           DO 10 IC=1,ICN
              WRITE(*,1000)IREC,IC,PNAM(JFM,IC),
     1        PUNIT(JFM,IC),PDES(JFM,IC),
     2        (INFO1(I),I=IC1(IC),IC2(IC))
10         CONTINUE
      ENDIF
      RETURN
```

```
1000    FORMAT(I7,I3,2A10,1X,A30,15A1)
1002    FORMAT('  Record #  Var Name  Units     '
     1 ,'Description',19X,'Value')
      END
      SUBROUTINE FXLIST(IREC,INFO,LTYPE,PPOS,
     *  PNAM,PUNIT,PFRMT,PDES,IRD)
C
C   FOR FIXED FORMAT DATA FILES
C   LIST VALUES FOR ALL FIELDS USING DEFINED
C   FORMATS
C
      CHARACTER*81 INFO
      CHARACTER*2 LTYPE,PPOS(20,20)
      CHARACTER*8 PUNIT(20,20)
      CHARACTER*9 PNAM(20,20)
      CHARACTER*12 PFRMT(20,20)
      CHARACTER*15 ADATA
      CHARACTER*30 PDES(20,20)
C
C LIST FIXED FORMAT RECORDS
C (ALL FIELDS FOR EACH FORMAT TYPE)
C
      READ(LTYPE,'(I2)') JFM
      CALL MFLDS(JFM,PPOS,MAXFLD)
      WRITE(*,1002)
      DO 10 IC=1,MAXFLD
         CALL GFLDX(JFM,IC,INFO,PFRMT,ADATA,IRD)
         IF(IRD.NE.0) GOTO 50
            WRITE(*,1010) IREC,IC,PNAM(JFM,IC),
     1      PUNIT(JFM,IC),PDES(JFM,IC),ADATA
10       CONTINUE
50    RETURN
 1002 FORMAT('  Record #  Var Name  Units     ',
     1 'Description',19X,'Value')
 1010 FORMAT( I7,I3,2A10,1X,A30,A15)
      END
      SUBROUTINE MFLDS(JFM,PPOS,MAXFLD)
C
C   DETERMINES NUMBER OF FIELDS PRESENT
C   FOR LINE TYPE JFM,
C   PASSES RESULT BACK AS MAXFLD
C
      CHARACTER*2 PPOS(20,20)
      MAXFLD = 0
   10 MAXFLD = MAXFLD + 1
      IF(PPOS(JFM,MAXFLD).EQ.'-9') GO TO 20
      IF(MAXFLD.LT.20) GO TO 10
      IF(MAXFLD.EQ.20) GO TO 30
   20 MAXFLD = MAXFLD - 1
   30 RETURN
      END
```

```
      SUBROUTINE GFLDX(LL,KK,INFO,PFRMT,AVAL,IRD)
      CHARACTER*1 ICM(12)
      CHARACTER*12 PFRMT(20,20),IWRK,WFRMT
      CHARACTER*15 AVAL
      CHARACTER*81 INFO
      EQUIVALENCE (ICM(1),IWRK)
C
C   DECIPHER FORMAT FOR FIELD (KK) IN LINE TYPE (LL)
C   READ INFO
C   TRANSFER VALUE TO MAIN
C
      IWRK = PFRMT(LL,KK)
C
C  FIND START AND STOP COLUMNS DEFINING
C  POSITION OF DATA VALUE AND FIELD WIDTH.
C  STARTING COLUMN OF VALUE = ISTART
C  FIELD WIDTH = IFLD
C
C   TEST FOR CASE ONE FORMAT
      IF(ICM(1).EQ.'A'.OR.ICM(1).EQ.'E'.OR.
     1  ICM(1).EQ.'F'.OR.ICM(1).EQ.'I') THEN
C
C  format has the form:  Lxx.xxx  or Lxx,
C                         where L = A,E,F or I
C
      IFLAG = 1
      ISTART = 1
      IC3 = 2
      IC4 = 2
   10 IF(ICM(IC4).EQ.'.'.OR.ICM(IC4).EQ.' ') THEN
           IC4 = IC4 - 1
           GO TO 75
           ENDIF
      IC4 = IC4 + 1
      IF(IC4.GT.12) GO TO 900
      GO TO 10
      ENDIF
C  TEST FOR CASE TWO OR THREE/FOUR FORMATS
      IC1 = 1
      IC2 = 1
   20 IF(ICM(IC2).EQ.'P') GO TO 22
      IF(ICM(IC2).EQ.'X') GO TO 25
      IC2 = IC2 + 1
      IF(IC2.GT.12) GO TO 900
      GO TO 20
   22 IFLAG = 2
C
C  Format has the form:  xPLxx.xxx,
C                         where L = E or F
C
      ISTART = 1
      IC3 = IC2 + 1
```

```
      IC4 = IC3
   23 IF(ICM(IC4).EQ.'.') THEN
      IC4 = IC4 - 1
      GO TO 75
      ENDIF
      IC4 = IC4 + 1
      IF(IC4.GT.12) GO TO 900
      GO TO 23
   25 IC2 = IC2 -1
      IC3 = IC2 + 2
   26 IF(ICM(IC3).EQ.',') GO TO 27
      IC3 = IC3 + 1
      IF(IC3.GT.12) GO TO 900
      GO TO 26
   27 IC3 = IC3 + 1
      IF(ICM(IC3).EQ.'A'.OR.ICM(IC3).EQ.'E'.OR.
     1  ICM(IC3).EQ.'F'.OR.ICM(IC3).EQ.'I') GO TO 30
      GO TO 40
C  MUST BE FORMAT TYPE THREE
   30 IFLAG = 3
C
C  Format has the form:  xxX,+Format One
C
      ISTART = 0
      IC3 = IC3 + 1
      IC4 = IC3 + 1
   35 IF(ICM(IC4).EQ.'.'.OR.ICM(IC4).EQ.' ') THEN
      IC4 = IC4 -1
      GO TO 75
      ENDIF
      IC4 = IC4 + 1
      IF(IC4.GT.12) GO TO 900
      GO TO 35
   40 IFLAG = 4
C
C
C  Format has the form:   xxX,+Format Two
C
      ISTART = 0
   45 IF(ICM(IC3).EQ.'E'.OR.ICM(IC3).EQ.
     1  'F') THEN
      IC3 = IC3 + 1
      IC4 = IC3 + 1
      GO TO 48
      ENDIF
      IC3 = IC3 + 1
      IF(IC3.GT.12) GO TO 900
      GO TO 45
   48 IF(ICM(IC4).EQ.'.') THEN
      IC4 = IC4 -1
      GO TO 75
      ENDIF
```

```
      IC4 = IC4 + 1
      IF(IC4.GT.12) GO TO 900
      GO TO 48
   75 CONTINUE
      IF(ISTART.EQ.0) THEN
      II = IC2 - IC1 + 1
      IF(II.LE.0) GO TO 900
      WRITE(WFRMT,1000) II
 1000 FORMAT( '(I',I3,')' )
      READ(IWRK,WFRMT) IS
      ISTART = IS + 1
      ENDIF
      II = IC4 - IC3 + 1
      JJ = IC3 -1
      IF(II.LE.0.OR.JJ.LE.0) GO TO 900
      WRITE(WFRMT,1010)JJ,II
 1010 FORMAT( '(',I3,'X,I',I3,')' )
      READ(IWRK,WFRMT) IFLD
C
      IF(ISTART.LE.0.OR.IFLD.LE.0) GO TO 900
C   NOW READ INFO FOR DATA VALUE
C
      IF(ISTART.EQ.1) THEN
      WRITE(WFRMT,2000) IFLD
 2000 FORMAT( '(A',I3,')' )
      ELSE
      II = ISTART - 1
      WRITE(WFRMT,2010) II,IFLD
 2010 FORMAT( '(',I3,'X,A',I3,')' )
      ENDIF
      READ(INFO,WFRMT) AVAL
      RETURN
  900 CONTINUE
      WRITE(*,3010) IFLAG,ISTART
 3010 FORMAT(1X,'FORMAT TYPE ',I3,' ISTART =',I2)
      WRITE(*,3020) IWRK
 3020 FORMAT(1X,'IWRK HAS THE VALUE OF ',A12)
      WRITE(*,3030) IC1,IC2,IC3,IC4
 3030 FORMAT(1X,'VALUES FOR IC1 THROUGH IC4 ARE ',4I3)
      IRD = 13
      RETURN
      END
```

GLOSSARY

The following is a glossary of terms and their specific definition as used in the M&T data archive. Data map key words are given in all capital letters, and all other terms with only the first letter capitalized. Additional key word definitions are given in the main text.

Archive number--A three-digit number assigned to a data set for idenification within the archive.

Checksum--Value provided to allow checking of the intregity of the archived data.

Data map--Term used to describe the archive structure that provides machine readable information on the location and format of archived data.

Documentation Report--A separate data set documentation report is written for each archived data set. A complete collection for all archived data sets occurs on the M&T data archive master tape.

FIELD--Key word used to mark variable definition in data map structure.

FORMAT--Key word used to mark location where the formats for achived data records are defined.

Format--Refers to the manner in which variables are encoded in data records, i.e., number of columns and type of varibles.

Header File--First file on archive data tape.

LIN--Key word in prefix line type position indicating variable data map information is encoded in that record.

Line--A three-character portion of the prefix that indicates the current type of record entry.

Line type--Refers to the type of information that is encoded on a given archive record.

Lnn--A key word in the prefix line type position indicating that archived data occurs in this record. The 'nn' part of this key word are digits in the range 00 to 99. The list of variables and their location in this record are mapped according to this line type entry.

Prefix--The first 18 columns of every record.

Record--Term is used as meaning logical record length or a single archive line entry.

Record Number--Records (or lines) are numbered consecutively; the first line has a record number of 000001.

REMARKS--A variable type used to define footnotes in tables.

RUN--This key word occurs in an entry which equates the original experimental designation of runs or experiments to the numeric value of run number use in the prefix.

Run number--Refers to a three-column numeric prefix entry indicating data for a specific run or experiment.

SET--Key word in prefix LINE position indicating information pertaining to the entire set occurs in this record.

SUB--Key word in prefix LINE position indicating data map information for a data subset occurs on this line.

Subset--A subdivision of the archived data.